

REMARKS/ARGUMENTS

In response to the Office Action dated September 25, 2006, claims 1 and 8-11 are amended, and claim 7 is canceled. Claims 1-6 and 8-14 are now active in this application.

The title of the invention has been amended and is now clearly indicative of the invention to which the claims are directed.

REJECTION OF CLAIMS UNDER 35 U.S.C. §112

Claims 7-11 are rejected under 35 U.S.C. §112, fifth paragraph, as being in improper form because a multiple dependent claim cannot depend from any other multiple dependent claim.

Claim 7 has been cancelled, and claims 8-11 have been amended into proper form.

REJECTION OF CLAIMS UNDER 35 U.S.C. §103

Claims 1 and 2 are rejected under 35 U.S.C. §103(a), as being unpatentable over Huang (US 2001/0045644) in view of Litwin (US 6,507,047).

Claims 3 and 4 are rejected under 35 U.S.C. §103(a), as being unpatentable over Huang (US 2001/0045644) in view of Litwin (US 6,507,047) and further in view of Mamitsu et al. (US 6,703,707).

Claims 1, 2, and 5 are rejected under 35 U.S.C. §103(a), as being unpatentable over Teshima (US 2002/015833) in view of Litwin (US 6,507,047).

Claim 6 is rejected under 35 U.S.C. §103(a), as being unpatentable over Teshima (US 2002/015833) in view of Litwin (US 6,507,047) and further in view of Patil et al. (US 6,507,047).

Claims 12 and 13 are rejected under 35 U.S.C. §103(a), as being unpatentable over Lin (US 6,184,580) in view of Litwin (US 6,507,047).

Claims 12 and 14 are rejected under 35 U.S.C. §103(a), as being unpatentable over Kurokawa (US 5,455,457) in view of Litwin (US 6,507,047).

Independent claim 1 recites, in part, “wherein a first intermediate member made of an electrically conductive material and a second intermediate member made of a material having lower heat conductivity than said first intermediate member are provided between said base material and said semiconductor chip.”

Independent claim 12 recites, in part, “a vessel in contact with said heat conducting member and encapsulating said semiconductor chip, said base material and said heat conducting member.”

To establish *prima facie* obviousness under 35 U.S.C. § 103(a) requires that all the claim limitations must be taught or suggested by the prior art. *In re Rokya*, 490 F. 2d 981, 180 USPQ 580 (CCPA 1974).

Huang, at paragraph [0024], merely states “the main source of heat generation is on the active surface 232 of the chip 230, and the die pad 210 is bonded directly to the active surface 232 of the chip 230. Therefore, the heat in the chip 230 can be dissipated directly through the second surface 214 of the die pad 210, that is, through the first side 202 of the package structure 200.” Huang does not teach or suggest the element “wherein a first intermediate member made of an electrically conductive material and a second intermediate member made of a material having lower heat conductivity than said first intermediate member are provided between said base material and said semiconductor chip” of independent claim 1, and does not teach or suggest the element “a vessel in contact with said heat conducting member and encapsulating

said semiconductor chip, said base material and said heat conducting member” of independent claim 12.

Litwin, at column 1, lines 63-66, merely states “[t]ransistors based on silicon carbide (SiC) have recently been studied [sic] as a possible alternative of transistors based both on Si and GaAs for power applications at GHz frequencies.” Litwin does not teach or suggest the element “wherein a first intermediate member made of an electrically conductive material and a second intermediate member made of a material having lower heat conductivity than said first intermediate member are provided between said base material and said semiconductor chip” of independent claim 1, and does not teach or suggest the element “a vessel in contact with said heat conducting member and encapsulating said semiconductor chip, said base material and said heat conducting member” of independent claim 12.

Mamitsu, at column 24, lines 49-53, merely states “the semiconductor chips 301, 302, the E heat sinks 303, the main surface 305a of the second conductive member 304, the back surface 306b of the third conductive member 306, and a part of the control terminal 307 are integrally sealed with resin 309.” Mamitsu does not teach or suggest the element “wherein a first intermediate member made of an electrically conductive material and a second intermediate member made of a material having lower heat conductivity than said first intermediate member are provided between said base material and said semiconductor chip” of independent claim 1, and does not teach or suggest the element “a vessel in contact with said heat conducting member and encapsulating said semiconductor chip, said base material and said heat conducting member” of independent claim 12.

Teshima, at paragraph [0019], merely states “a semiconductor chip 12, which generates heat, a lower heat sink 13 and an upper heat sink 14, which conduct the heat generated by the

semiconductor chip, and a heat sink coupler 15.” Teshima does not teach or suggest the element “wherein a first intermediate member made of an electrically conductive material and a second intermediate member made of a material having lower heat conductivity than said first intermediate member are provided between said base material and said semiconductor chip” of independent claim 1, and does not teach or suggest the element “a vessel in contact with said heat conducting member and encapsulating said semiconductor chip, said base material and said heat conducting member” of independent claim 12.

Patil, at column 8, lines 29-33, merely states “fixed portion 82 of the heat sink includes a first, disk-like region 84 having a preferably flat surface in close proximity to the die 52 and a second disk-like region 86 of increased diameter terminating in an upper, flat surface 87.” Patil does not teach or suggest the element “wherein a first intermediate member made of an electrically conductive material and a second intermediate member made of a material having lower heat conductivity than said first intermediate member are provided between said base material and said semiconductor chip” of independent claim 1, and does not teach or suggest the element “a vessel in contact with said heat conducting member and encapsulating said semiconductor chip, said base material and said heat conducting member” of independent claim 12.

Lin, at column 3, lines 58-61, merely states “a silicon chip 20, a first heat sink 26, a second heat sink 42, a plurality of conductive leads 36, a substrate 35, a plurality of solder balls 29 and a molding compound 28.” Lin does not teach or suggest the element “wherein a first intermediate member made of an electrically conductive material and a second intermediate member made of a material having lower heat conductivity than said first intermediate member are provided between said base material and said semiconductor chip” of independent claim 1,

and does not teach or suggest the element “a vessel in contact with said heat conducting member and encapsulating said semiconductor chip, said base material and said heat conducting member” of independent claim 12.

Kurokawa, at column 5, lines 1-5, merely states “a semiconductor chip 1 is securely mounted to a package substrate 2 having input/output pins 3. The package substrate 2 is made of aluminum nitride. The semiconductor chip 1 and the package substrate 2 are electrically interconnected through wire bonding 4.” Kurokawa does not teach or suggest the element “wherein a first intermediate member made of an electrically conductive material and a second intermediate member made of a material having lower heat conductivity than said first intermediate member are provided between said base material and said semiconductor chip” of independent claim 1, and does not teach or suggest the element “a vessel in contact with said heat conducting member and encapsulating said semiconductor chip, said base material and said heat conducting member” of independent claim 12.

Thus, independent claim 1 and independent claim 12 are not obvious in view of the cited prior art.

Under Federal Circuit guidelines, a dependent claim is nonobvious if the independent claim upon which it depends is allowable because all the limitations of the independent claim are contained in the dependent claims, *Hartness International Inc. v. Simplimatic Engineering Co.*, 819 F.2d at 1100, 1108 (Fed. Cir. 1987). Accordingly, as independent claims 1 and 12 are patentable for the reasons set forth above, it is respectfully submitted that all claims dependent thereon (claims 2-6 and 9-11; and 13 and 14 respectively) are also patentable. In addition, it is respectfully submitted that the dependent claims are patentable based on their own merits by adding novel and non-obvious features to the combination.

Thus, dependent claims 2-6, 9-11, 13, and 14 are not obvious in view of the cited prior art.

CONCLUSION

Accordingly, it is urged that the application, as now amended, is in condition for allowance, an indication of which is respectfully solicited. If there are any outstanding issues that might be resolved by an interview or an Examiner's amendment, Examiner is requested to call Applicants' attorney at the telephone number shown below.

Accordingly, it is urged that the application, as now amended, overcomes the rejection of record and is in condition for allowance. Entry of the amendment and favorable reconsideration of this application, as amended, are respectfully requested. If there are any outstanding issues that might be resolved by an interview or an Examiner's amendment, Examiner is requested to call Applicants' attorney at the telephone number shown below.

To the extent necessary, a petition for an extension of time under 37 C.F.R. 1.136 is hereby made. Please charge any shortage in fees due in connection with the filing of this paper, including extension of time fees, to Deposit Account 500417 and please credit any excess fees to such deposit account.

Respectfully submitted,

McDERMOTT WILL & EMERY LLP
ED GARCIA-OTERO # 56,609
for MIKE FOGARTY

Michael E. Fogarty
Registration No. 36,139

600 13th Street, N.W.
Washington, DC 20005-3096
Phone: 202.756.8000 MEF/EG:cac

**Please recognize our Customer No. 20277
as our correspondence address.**

Application No.: 10/536,828

Facsimile: 202.756.8087

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